

The goal and job of farmers is to feed the world. With today's ever-growing population, that is becoming more and more difficult. That is where we need and use technology. However, the topic of Ag technology is about as big as the job of feeding the world itself. To help understand this topic, we're going to break this topic into three categories: equipment, bio engineering, and animal technology.

Let's start with equipment. Now this is the category people most people think of when they hear the topic of Ag Technology. This category includes anything from the smallest of drones to the biggest of sprayers, but those two pieces of equipment may be more closely related than they seem. The future for this category looks to be moving away from the bigger is better mindset and taking big steps in a smaller direction. Precision farming looks to be the new trend heading into the future of Ag technology. Precision Ag Technology has been around for three decades, but huge strides have been happening in this field. According to the Southwest Farm Press of December 13 2018, these steps have been made by combining precision farming with artificial intelligence or AI. 'Precision with a purpose' as Tim Norris from Ag info calls it. One example of AI enabled technology that could come first would be remote sensing to improve scouting. BIS research on July 30 2018 shows how agricultural robots may be used to treat soil and crops selectively and reduce the need for manual labor. Farmers use and analyze this data in ways that have never been used before and farmers of the future may just do more data analysis than planting or harvesting.

However, it's not only the process of farming that is changing and evolving but the plants themselves. Plant genetics are another application of technology coming to the farm. Robb Fraley, former Monsanto (now Bayer) Chief Technology Officer said at the 2018 Ag Expo "with all of today's breeding and technologies, we can find that one in a trillion trait in just 3 months of

research work. AI can also be used in this field as well. Ag Pro in December 18 2018 reports that plant breeders use AI and gene editing to be more precise and faster in their development of advanced genetics. Indigo, a company that specializes in analyzing microbiomes of plants, is working to produce seed coatings that will form several positive attributes in the production cycle. Southwest Farm Press reports on July 30 2018 that Indigo is working to create drought resistant crops. Another plan is to produce crops that are insect and pest resistant. They could achieve this by coating seeds, similar with today's methods and then incorporate microbes into an internal environment as the seeds sprout. This is all in an effort to develop better plants and ultimately better and more productive crops for the future.

Last but not least, we can't forget ranching. The technology craze has taken over farming and ranching is no exception. On a small scale BIS research shows that autonomous milking robots are soon to be introduced to help with milk harvest and making the process more efficient. Other ideas include the greater integration of aquaculture and breeding management software. Arguably, the latest new technology in the ranching field may just be collars for cows. However silly it may sound high-tech livestock collars provide many benefits, and unlike the name suggests, they are for more than just cows, but all cattle and livestock. The Wall Street Journal in April of 2018 reports that in 2017, farmers spent over \$300 million on agriculture spending. With the high tech cattle collars, virtual fences would be put up. The collars would function using GPS technology and establish a home base. Then, virtual fences would go up in relation to the home base. If an animal were to approach these fences a small noise would emit from the collar to discourage the animal from going further, and if they actually crossed the fence, they would receive an electric shock, similar to a dog with a shock collar. This technology would save money, allow farmers to track their cattle, boost production, and allow grazing

pastures to recover. With this technology controlling cattle would be easier than controlling dogs, workers, and even helicopters.

So, it's no big secret, technology is on the rise and farming is changing, but these new changes and advancements can and are helping to make farming more efficient and yield better crops. Though not always connected, farming and technology now rely on each other to make each other better. "Agriculture needs technology, but technology needs agriculture because it can showcase the opportunities of technology", states Josh Henretig, and the future of agriculture with technology looks bigger and more plentiful than ever.